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## **An exploratory study on reaction time to valenced memories: The importance of individual differences**

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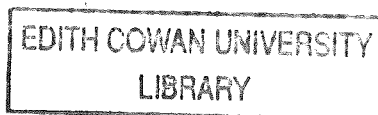
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**2009**

**Bachelor of Arts**

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# Valence, Memory and Reaction Time:

## A Review of the Literature

Emrah Ates

## Valence, Memory and Reaction Time:

## A Review of the Literature

## Abstract

It is commonly accepted that valence has influences on long-term memory, but there are diverse results concerning methodology and the effect size. The literature is mixed with some authors reporting evidence consistent with negativity bias, others reporting evidence consistent with positivity bias and still others reporting no effect of valence on certain types of memory. This review argues that while there are divergent results for recall rate studies, reaction time studies and emotional Stroop task studies showed predominant negativity bias in long term memory. Moreover, many of the studies reviewed were solely concerned with group effects, rather than individual differences. It was concluded that there is value in exploring individual differences and developing standardized evaluation techniques in the area of memory and emotion.

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## Valence, Memory and Reaction Time:

### A Review of the Literature

The psychological research history on emotion is a long but sparse one, starting with the clinical studies of Jung and Freud. Jung (1910) was the first to take a systematic investigative step towards emotion via diagnostic possibilities of association experiments. In Jung's free association method, individuals were instructed to reply with whatever word comes into their minds as a reaction to the presented word as soon as possible. He compared the word associations of healthy controls with those of patients of varied diagnostic groups, and his interest centered on differences between the grammatical and logical relations of stimulus and reaction words given by the client. Findings concerning individuals' 'reaction time', 'reproduction-difficulties' and so called 'complex-indicators' stimulated great interest in the area, and this was accompanied by a shift in diagnostic aim from the diagnosis of psychiatric categories to the diagnosis of individual emotional problems or complexes.

Jung (1910) was particularly concerned with the complex-indicator potential of the prolonged reaction times in his free association method. He noted that when a complex word was present in an individual's memory, the word association task for this word took longer time than for other words. In his study, Jung concluded that using free association was helpful in revealing the complexes of the subject. Jung claimed that prolonged reaction time was indicative of negative emotional experience.

An influential factor for the literature of emotion and long term memory was the publication of the initial works of Freud in 1914. In the *'Psychopathology of Everyday*

*Life*' Freud analysed certain phenomenon of forgetting and of substitution of other material for the forgotten memories and actions; he asserted that forgotten material which he analysed was related to ideas significant and personally painful to the subject (Freud, 1914). He claimed that the free association method can be considered to be a way of studying the unconscious and the reason for unpleasant ideas taking longer time is that they are repressed.

Earlier, Wreschner (1907) and Menzerath (1908) had established that associations which had pleasant or unpleasant valences tended to show longer reaction times than those with neutral valences, and unpleasant associations tended to show longer reaction times than pleasant ones (see the review by Rapaport, 1961). Similar findings were reported by Mayer and Orth (1901), White and Powell (1936) and Dahl (2001) on unpleasant stimuli causing longer reaction time than pleasant ones.

The studies that showed that longer reaction times were associated with negatively valenced words are consistent with the negativity bias theory (Baumeister, Bratslavsky, Finkenaeuer, & Vohs, 2001). Baumeister and colleagues (2001) asserted that the greater power of bad events over good ones is found in nearly every aspect of psychology as everyday events. Bad emotions, bad parents and bad feedback have more impact than good ones, and bad information is processed more thoroughly than good (Baumeister et al., 2001).

Some studies (Birnbaum, 1919; Dolcos & Cabeza, 2002; Siegel, Johnson & Sarason, 1979; Spaniol, Voss & Grady, 2008) have found no effect of unpleasant and pleasant stimuli on long term memory. Dolcos and Cabeza (2002) and Siegel, and colleagues (1979) used tasks of recall rate in their studies and found that there is no significant difference for recall rates of positive and negative valenced stimuli. Likewise, Birnbaum (1919) and Spaniol and colleagues (2008) measured the reaction

times of participants to negative and positive valenced stimuli and their results revealed no significant difference between the two stimuli.

In contrast with these different findings, Rozin and Royzman (2001) reviewed a broad body of evidence and concluded that memory functions are broadly positively biased. The meta-analysis of Joorman, Gotlib and Teachman (2009) revealed evidence of positivity bias for long term memory in 20 studies. The results of Holmes' (1970), Taylor's (1991) Thompson's (1982) studies also supported the positivity bias theory that memory favours good events rather than bad ones. The next section of the present review will try to shed light on this debated area of psychology by synthesizing and contrasting findings in different levels of memory.

Individual differences have recently been rediscovered as being important in the study of emotion and negativity bias. The rediscovery is strange, given that Jung (1910) studied individual differences. Group-based analyses dominate the studies reviewed by Baumeister et al. (2001), and by Rozin and Royzman (2001). Although the research done on negativity and positivity bias shows important group effects, important information is lost when relying solely on group results (Ito & Cacioppo, 2006).

The present literature review consists of three main parts. Firstly negativity and positivity bias theories on different levels of memory will be considered. Secondly, individual differences on emotion will be reviewed. Thirdly, the conclusion and recommendations section will be presented.

### Negativity and Positivity Bias

"... We have found that bad stronger than good in a disappointingly relentless pattern. This difference may be one of the most basic and far-reaching psychological principles. . ." stated Baumeister and colleagues in 2001, (p.362).

For many years in psychological studies, an asymmetry in individuals' evaluation of positive and negative phenomena has been reported (Lewicka, Czapinski & Peeters, 1992). At first, the phenomena were treated as an artifact of the methods used and various attempts were made to eliminate it by improving the measurement instruments. A classical example is the Role Construct Repertory Test, for which a frequency balance between positive and negative poles was seen as a criterion of psychometric goodness (Bannister & Mair, 1968). In the late 60's and early 70's, the presumed artifact was given theoretical significance and became known under a variety of labels; Vigilance Hypothesis (Irwin, Tripodi & Bieri, 1967), Leniency Effect (Bruner & Tagiuri, 1954), Positive Negative Asymmetry (Peeters, 1971), the widely acknowledged Negativity Effect or Negativity Bias (Kanouse & Hanson, 1971).

A large volume of literature supports the existence of a negativity bias (Baumeister et al., 2001; Cacioppo & Berntson, 1994; Cacioppo, Gardner & Berntson, 1997; Ito, Cacioppo, & Lang, 1998; Kanouse & Hanson, 1971; Taylor, 1991; Peeters & Czapinski, 1990; Skowronski & Carlston, 1998). In these studies, the greater power of bad events over good ones is found in everyday events (Rozin & Royzman, 2001), major life events (Helson, 1964), close relationship outcomes (Baumeister & Leary, 1995), social network patterns (Newcomb, Bukowski & Pattee, 1993), interpersonal interactions (Esses & Zanna, 1995) and learning processes (Constantini & Hoving, 1973). Bad emotions, bad parents and bad feedback have more impact than good ones, and bad information is processed more thoroughly than good (Baumeister et al., 2001).

The existence of the negativity bias is controversial in memory. In their review, Baumeister et al. (2001) supported the existence of negativity bias in memory. He stated that there is a preponderance of unpleasant memories even among people who rated their childhoods as having been relatively pleasant and happy (see Kreitler & Kreitler,

1968) and superior recall for unfavourable information was found in past studies (see Bless, Hamilton & Mackie, 1992; Dreben, Fiske & Hastie, 1979; Skowronski & Carlston, 1987). In contradistinction to Baumeister and colleagues, Rozin and Royzman (2001) published their literature review that supports the idea of positivity bias in memory.

According to the positivity bias theory (Matlin & Gawron, 1979), the brain processes pleasing and agreeable information more precisely compared with unpleasant information. The term positivity bias can be used to refer to a variety of human tendencies: faster recognition of pleasant stimuli, the perception of pleasant stimuli occurring more regularly, the tendency for an individual to expose themselves to pleasant stimuli more frequently than unpleasant stimuli, the increased accuracy of recall for pleasant stimuli, and rapid processing of positive information compared to negative stimuli (Matlin & Gawron, 1979). The explanation behind this phenomenon is that the cognitive and memory processes favour positive information over negative information (Matlin & Stang, 1978).

Baddeley (1982), Ehrlichman and Halpern (1988), Linton (1982; 1986), Thompson (1985), Wagenaar (1986) and White (1982) also support positivity bias theory in memory in their studies. Later, Taylor (1991) came to a similar conclusion suggesting that compensatory responses minimize negative memories, which occur gradually over time, thereby accounting for the finding of increased positivity bias with delay. Taylor asserted that the major reason for the positivity bias is not that negative events are inherently less memorable but rather they are neutralized over time.

The next sections will compare and contrast results of memory studies on tasks of recall rate, the Emotional Stroop and reaction time in terms of positivity and negativity bias.

*Long term memory, valence and recall rate*

There is still an ongoing academic discussion on recall rate of long term memory regarding the dominance of positive and negative valence. There is a body of research that support negativity bias theory in long term memory (Bless et al, 1992; Dreben, Fiske & Hastie, 1979; Kensinger & Corkin, 2003; Kreitler & Kreitler, 1968; Skowronski & Carlston, 1987; Robinson-Riegler & Winton, 1996). For example Kensinger and Corkin (2003) used a free recall task that was given with a one day interval in which participants were asked to remember their answers. The results of the study revealed that individuals' recall was better for negatively valenced memories than positive and neutral ones,  $F(2, 80) = 12.9, p < 0.1$ . Storbeck and Clore (2005) employed 100 university student participants who received instructions and heard a cover story designed on a long term memory task to disguise the purpose of the mood-induction procedure (listening to the music) and the recall was based on a long term memory task. The results revealed that there was a significant difference on the recall task, and the primary conclusion of the study was that negatively valenced affective cues reduced levels of false memory. Hence, both studies showed that there is an emotional negativity bias associated with long term memory.

In contrast, there are few studies that showed no valence effect for long term memory. Siegel, Johnson and Sarason (1979) employed 244 female college students to study the effect of life changing events in long term memory. Positive and negative recent events marked on given checklists were used to study the recall rates of negative and positively valenced long term memories. The results revealed that there is no difference of retrieval rate on past negative and positive events of participants. Similar results were reported on long term memory and emotion. Dolcos and Cabeza (2002) used the International Affective Picture System (IAPS) (Lang et al., 1997) in 2002 and



found that there is no significant difference for recall rates of positive and negative valenced pictures (positive, 52 %, negative 53%).

There are also studies that showing that recall rate for positive stimuli is stronger than negative stimuli (Baddeley, 1982; Ehrlichman & Halpern, 1988; Holmes, 1970; Linton, 1982; Linton, 1986; Matlin & Stang, 1978; Taylor, 1991; Thomas & Diener, 1990; Thompson, 1985; Wagenaar, 1986; White, 1982). Thomas and Diener (1990) found that individuals tend to underestimate the frequency of negative affect, but not positive affect. In the recall rate study of them, the results of the study revealed that the variance explained by the positive intensity was 30% whereas the variance explained by the negative intensity was 12%. Hence this study supports the positivity bias for recall accuracy.

Thompson (1985) conducted a study on long term memory with 32 participants on unique personal events. Memory for naturally occurring episodic events was measured along with memory for the date of occurrence of those events. Participants in the experiment recorded unique personal events for themselves and their roommates for 14 weeks. The study showed that the dates and details of events for positively valenced events were remembered better than the negatively valenced events. Furthermore, Taylor (1991) asserted that the major reason for the positivity bias is not that negative events are inherently less memorable but rather they are neutralized over time.

Although the literature is mixed with respect to negativity or positivity bias in long term memory, it appears that lack of positively biased memory is perhaps the most robust cognitive finding associated with major depression (Matt et al., 1992). In a meta-analysis of studies assessing recall performance, Matt et al. (1992) found that people with major depression remember 10% more negative than positive words. Non-

depressed control participants in contrast, demonstrated a memory bias for positive information in 20 of 25 studies (Joorman, Gotlib, & Teachman, 2009).

In short, this section of the review showed that there is an ongoing discussion on recall rate of long term memory and there have been studies done supporting both theories of negativity and positivity bias as well as studies with nonsignificant results.

### *The Stroop and Emotional Stroop Studies*

The Stroop task has long been used by experimental psychologists to study attentional processes. In Stroop's experiment (1935), a participant was required to name the colour of the ink in which a word is printed, while attempting to ignore the word itself. Wordlike characters (as rows of X's or actual names of colours) was manipulated. Hence, 'red' might appear in green ink, 'brown' might appear in red ink and the like. Stroop found that it takes participants longer to name the colours when the base items are contrasting colour names than when they were rows of meaningless stimuli.

The emotional Stroop task is a modification of the Stroop's (1935) design, where the stimulus word has an emotional valence, for example 'sadness'. Significantly slower reaction times have been reported for negatively valenced words for depression-related, anxiety-related and obsessive compulsive-related patients compared with healthy controls. For example Williams, Mathews and Macleod (1996) studied individuals with anxiety disorder in their study. Using threatening words in their experiment, 24 participants were grouped on the basis of whether their worries were predominantly social or physical. The patients were tested with Stroop cards, each containing 96 stimuli (12 words repeated eight times). The words on the first card represented physical threat and on the second represented social threat and those on the other cards were unthreatening. The results showed that there was a significant (44 ms) delay with the response of colour naming for the threat words than for the non threat words. Moreover,

there was also a relationship between the type of threat word that most disrupted the colour naming and the type of worries that predominated in the patient. Only physical worriers were disrupted on the physical threat words (52 ms) whereas social worriers showed a 44 ms facilitation on the same words. Thus, it was found that the presence of disruption was significantly associated with the psychopathology of the individuals.

Gotlib and McCann (1983) used neutral, negatively and positively valenced words in their study of students with mild depression. Fifteen high and 15 low scorers on the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) named the colours of 50 neutral, 50 negatively valenced and 50 positively valenced words presented. Results showed that the participants with mild depression were significantly slower (23 ms) in naming the colours of the negatively valenced words than of the positively valenced or neutral words. The effect size of the experiment was 0.55 as measured by Cohen's *d*. A long term memory task was presented during the second experiment of the same study, on recall rates of participants. Recall rates of individuals showed that all subjects (both depressed and non-depressed) recalled significantly more negatively valenced than either neutral or positively valenced words, with effect size of 0.76 (for negative vs. neutral words) and 0.48 (for negative vs. positive words).

There are more than 400 studies conducted on the emotional Stroop task since 1935 and some of the significant ones are listed below in Table 1. This table shows that larger interference sizes appear with existing psychological disorders. Therefore it can be asserted that the effect of emotional Stroop task becomes stronger, with increasing severity of psychological disorder. Moreover, it is clear that the emotional Stroop task studies support the negativity bias theory in long term memory.

Table 1

*Studies of emotional Stroop task and interference sizes*

Study	Method	Participants	Interference(ms)
McNally (1992)	Computer& words	Panic D.&Control	24
Foa et al. (1993)	Computer& words	Panic D.&Control	36
Martin et al.(1991)	Stroop Cards	Anxious&Control	72
Fox (1993)	Stroop Cards	Low&High Anxiety	80
Richards&French(1990)	Computer& words	Low&High Anxiety	120
Richards et al (1992)	Computer&words	Low&High Anxiety	129
Martin et al. (1992)	Stroop Cards	Phobia&Control	154
Martin et al. (1992)	Stroop Cards	Phobia&Control	159
Watts et al.(1986)	Stroop Cards	Phobia&Control	190
McNally et al.(1993)	Stroop Cards	PTSD&Control	290
McNally et al (1990)	Stroop Cards	PTSD&Control	300
Foa et al (1991)	Computer&words	PTSD&Control	400

*Long term memory, valence and reaction time*

There are a small number of studies investigating reaction time to assess the effect of valence on long term memory. The methodologies used are different; which makes it difficult to draw clear conclusions, though most of the previous studies have found the negativity bias (Dahl, 2001; Freud, 1914; Jung, 1910; Mayer & Orth, 1901 Menzerath, 1908; White & Powell, 1936; Wreschner, 1907). Jung (1910) was the first to take a systematic investigative step of reaction time by association experiments. From studies of individual cases, he concluded that prolonged reaction time was indicative of

negative emotional experience. Likewise, Freud (1914) reported prolonged reaction time to negatively valenced memories in the *Psychopathology of Everyday Life*. He proposed that studying on reaction time is a way of discovering the unconscious, and he argued that repression is the reason for prolonged reaction time to unpleasant memories.

In their study of the free association task, White and Powell (1936) created emotional word lists which were based on the subjects' previous answers (pre-evaluation) and the most frequently given answers were used in word lists. The reaction times of 16 individuals for negatively and positively valenced words were measured and showed that negatively valenced words were significantly more slowly responded to than positively valenced words. The reaction time to positive words was 514 ms ( $SD=104$ ) and negatively valenced words was 600 ms ( $SD=135$ ) and the effect size as measured by Cohen's  $d$  was 0.82 for this study.

Dahl (2001) used valenced word lists from the Affective Norms for English Words (ANEW) (Bradley & Lang, 1999), without controlling for arousal, and studied the reaction time on an emotion detection task. Dahl's study showed significantly prolonged response latencies for negative words compared to positive ones ( $M$  for negative words=958 ms,  $M$  for neutral words=1011 ms and  $M$  for positive words=904 ms  $F(2, 58)=12.78, p<0.001$ ) with an effect size of 0.33 as measured by Cohen's  $d$ .

It is important to speculate on why the effect sizes between Dahl (2001) and White and Powell (1936) were so different. In White and Powell's study, emotional word lists were created based on the subjects' previous answers (pre-evaluation) and the most frequently given answers were used as stimuli during the free association experiment which shows that the chosen words used as stimuli had particular meanings for participants. Hence, the reason of different effect sizes between White and Powell's

and Dahl's studies might be either attributed to the nature of the word lists used in the studies, or to the use of free association and emotion detection.

In contrast, Birnbaum (1919) used the free association task and measured his participants' reaction time in his study. The result revealed no significant difference between the reaction times of 24 participants to negatively and positively valenced stimuli. In his study, Birnbaum used fixed word lists which were not based on participants' previous experiences, and he argued that this methodology might be the reason for the result of the study.

Likewise, Spaniol, Voss and Grady's (2008) study found no effect of valence for reaction time to valenced long term memory. In their study, the effect of ageing on reaction time to valenced stimuli was measured for 24 young (aged 18-35) and 23 old (aged 60-85) participants. One hundred thirty two words (negative, positive, neutral) selected from Affective Norms for English Words (Bradley & Lang, 1999) were presented to participants. The experiment was a rating task based on participants' long term memory. The results revealed that there was no difference in participants' reaction time to presented valenced stimuli for both young and old participants.

Hence, most of the reaction time studies show that negatively valenced words are responded to significantly more slowly than positively valenced words, although there are few studies conducted in this area. It is difficult to draw conclusions since there have not been enough studies with fixed measurement techniques to enable a demonstration of the effect of valence on long term memory.

#### Individual Differences in Emotion and Memory Studies

Although the studies reviewed in the previous section have provided an indication of the importance of valence, important individual information is lost when

relying on group results (Kosslyn et al., 2002). For instance, Bradley and Lang presented the instruction manual and affective ratings of English words in 1999, but they did not acknowledge the importance of individual differences in the perception of words.

Moreover, studies supporting negativity and positivity bias theories report group results, and no attention appears to be paid to the individual differences.

For example, consider the word “snow” which is rated as positively valenced in Bradley and Lang’s (1999) ANEW list. According to ANEW’s nomothetical results and the positivity bias theory, the word should take a short time to react to. Whereas, if that participant had a previous experience of an avalanche, they might spend a very long time on the word ‘snow’ because of having had a past traumatic event relating to this word as was proposed by Jung (1910). The reaction time differences of individuals may have very different results than the standard reaction times calculated based on group data.

An example of the individual differences in the perception of valence and reaction time is the classic study by Jung (1910). In Jung’s first experiment, a series of stimulus words were read out and the task required the participant ( $n=1$ ) to verbalize one word to be associated with the stimulus word. Jung measured how long it took the participant to respond to each stimulus word. After this first task, the participant was required to recall her own answers to each stimulus word. Four interesting patterns occurred during Jung’s experiment. Of the 13 trials, the participant had four reaction times above two minutes. For instance, the reaction time to the word ‘water’ took five minutes and the word ‘lake’ took four minutes. Incorrect recall occurred only on those trials with delayed reaction time. This is another example of deviation from standardized group ratings. For example, the word ‘water’ is rated in the ANEW database (Bradley & Lang, 1999) as highly positively valenced ( $M=6.61$ ) by the

population. However, because these words led to such a marked disruption in the participant's performance, it is evident that they were considered highly negative to this individual. Jung (1910) further revealed that this individual had experienced certain events which had led to a momentary contemplation of suicide by drowning. Therefore, although these methods are in some ways removed from mainstream group studies of emotion, Jung demonstrated the value of an individual differences approach and the marked variation in individual compared to group judgments of emotion.

A further example of the effect of individual differences on emotional studies may be found with the emotional Stroop Effect. Mathews and Klug (1993) used an emotional Stroop task to compare the levels of interference in color naming for anxious (generalized anxiety disorder  $n = 11$ , panic disorder  $n=6$ , social phobia  $n=3$ ) compared to non-anxious controls ( $n=20$ ). The emotional words were judged and rated for their relevance (both positive and negative) to concerns shared by these classes of anxiety (e.g. 'panic', 'dying' & 'competent'). Results for the anxious group, showed that related words led to significantly more interference than unrelated words  $F(1, 19) = 8.9, p < .01$ . Therefore, despite the valence of the stimuli, only words related to the individual's current concerns impacted performance. Hence, relevant words were arousing to the anxious group, and this demonstrated the effect of individual differences. Indeed, for the anxious participants the words 'panic' and 'relaxed' led to interference in color naming. It is evident that what is valenced and arousing is determined by the individual, and can deviate markedly from standardized stimulus lists. The degree of personal concern inherent in the experimental stimuli is more potent in affecting performance than valence as highlighted in the Williams and colleagues' (1996) study reviewed in the previous section.



It may therefore be concluded that there are individual differences in experiments on emotion. Given the marked variation in an individual's perception of emotional stimuli, the systematic documenting of idiographic patterns of response is considered a fruitful direction for future research (see also Kosslyn et al. 2002).

### Conclusion and Recommendations

This review has addressed research that highlights gaps in the current investigation of the effects of valence at different stages of memory, methods to integrate research done across levels of analysis, and the academic tendency of relying on group based methodology.

Firstly, although this review attempted to integrate and provide an explanation for the diverse results in this area regarding the effects of valence on memory, more work remains to be done. Further research is required to give an understanding of the relative influence of valence on different stages of memory, because results are inconsistent. Whilst most results in memory studies support negativity bias theory, there are some that support positivity bias theory and a few others with insignificant results. Two of the important reviews on negativity (Baumeister et al., 2001) and positivity bias (Rozin & Royzman, 2001) theories support different explanations on recall rate, with research evidence supporting each side. Therefore recall rate studies on long term memory have produced the most divergent results causing ongoing discussion on this issue. Studies of reaction time, however, show more consistent evidence for negativity bias theory. Emotional Stroop task on the other hand is the most consistent among the three methods to support negativity bias theory. Hence, as highlighted by Anderson (2005) much work remains to be done before a better understanding of how valence affects individuals' long term memory.

Secondly, it is evident that the theoretical and methodological integration across different levels of analysis needs further development. For example, the main problem identified in this review was the inconsistent measurement of valence in emotional stimuli. One factor that contributed to this was the lack of available standardized stimuli, especially for the studies preceding implementation of the Affective Norms for English Words (ANEW) which was developed by Bradley and Lang (1999). On the other hand, a standardized assessment tool for memory tasks has still not been developed. The use of such resources contributes to both aims of tighter experimental control and the ability to compare across levels of investigation.

Thirdly, the tendency to conduct experiments by relying on group research in this area highlights the gap in an understanding of individual differences. This reveals an opportunity to conduct studies on the relative influence of valence and memory on an individual level. As Kosslyn et al. (2002) noted, individual differences are a rich source of information and when integrated with a group based result, can contribute explanations above and beyond either approach independently. Although there has been some work on individual differences in emotional studies, this has not been a research focus since the pioneering studies of Jung (1910).

Finally, in attempting to integrate previous work to provide an explanation for the effects of valence and memory, this analysis found divergent results for recall rate; the predominance of negativity bias in reaction time studies and dominance of negativity bias in emotional Stroop studies. Researchers in this field should consider standardized measurement techniques to draw clearer conclusions, and the key role of individual differences in emotional studies.

## References

- Anderson, A. K. (2005). Affective influences on the attentional dynamics supporting awareness. *Journal of Experimental Psychology: General*, 134, 258-281.
- Anderson, N. H. (1965). Averaging versus adding as a stimulus-combination rule in impression formation. *Journal of Personality and Social Psychology*, 2, 1-9.
- Baddeley, A. D. (1982). Emotional factors in forgetting. In A. Cope (Ed.), *Your memory: A user's guide* (pp. 65-73). New York: Macmillan.
- Bannister, D. & Mair, J. M. M. (1968). *The Evaluation of Personal Constructs*, Academic Press, London.
- Baumeister, R. F., Bratslavsky, E. , Finkenauer, C. , & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, 5, 323-370.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motive. *Psychological Bulletin*, 117, 497-529.
- Beck, A.T., Ward, C.H., Mendelson, M., Mock, J.E.& Erbaugh, J.K.(1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4, 561-571.
- Birnbaum, K. (1912). Ueber den Einfluss von Gefuehlsfaktoren auf die Assoziationen. *Monatschrift Psychiatrisches Neurologie*, 32, 95-123.
- Bless, H., Hamilton, D.L. & Mackie, D.M.(1992). Mood effects on the organization of person information. *European Journal of Social Psychology*, 22, 497-509.
- Borgatta, E. (1961). Mood, personality, and interaction. *Journal of General Psychology*, 64, 105-137.
- Boucher, J. & Osgood, C.E. (1969). The Pollyanna Hypothesis, *Journal of Verbal Learning and Verbal Behaviour*, 8, 1-8.
- Bradley, M. M., & Lang, P.J. (1999). *Affective norms for English words (ANEW)*:

*Instruction manual and affective ratings (Tech. Rep.C-1)*. Gainesville, FL:

University of Florida.

Bradley, M. M., & Lang, P.J. (2007). Emotion and Motivation. In J.T. Cacioppo, L.G.

Tassinary, & G.G. Berntson (Eds.), *Handbook of psychophysiology* (3<sup>rd</sup> ed.,

pp581-607). New York: Cambridge University Press.

Braganza, L. (2008). *The Dimensionality of Emotion and Individual Differences*.

Unpublished Honours' Thesis, Edith Cowan University, Perth, Western

Australia.

Briggs, K. (2009). *Cognitive Processing of Visual, Semantic Information*. Unpublished

PhD Thesis, University of Tasmania, Australia.

Bruner, J. S. & Tagiuri, R. (1954). 'The perception of people'. In: Lindzey, G. (Ed.)

*Handbook of Social Psychology*, 1st edn., Vol. 2, Addison-Wesley, Reading,

Mass. pp. 634-654.

Cacioppo, J. T., & Berntson, G. G. (1994). Relationship between attitudes and

evaluative space: A critical review, with emphasis on the separability of positive

and negative substrates. *Psychological Bulletin*, 115, 401-423.

Cacioppo, J. T., Gardner, W. L., & Berntson, G. G. (1997). Attitudes and evaluative

space: Beyond bipolar conceptualizations and measures. *Personality and Social*

*Psychology Review*, 1, 3-25.

Cedrus Corporation (2009). SuperLab 4.0. [Computer software]. San Pedro, CA:

Cedrus Corporation.

Clyde, D. J. (1963). *Manual for the Clyde Mood Scale* Coral Gables, FL: Biometric

Laboratory, University of Miami.

Constantini, A. F., & Hoving, K. L. (1973). The effectiveness of reward and

- punishment contingencies on response inhibition. *Journal of Experimental Child Psychology*, 16, 484-494.
- Curran, J. P., & Cattell, R. B. (1974). *The Eight State Questionnaire*. Champaign, IL: Institute for Personality and Ability Testing.
- Dahl, M. (2001). Asymmetries in the processing of emotionally valenced words. *Scandinavian Journal of Psychology*, 42, 97-104.
- Dreben, E. K., Fiske, S. T., & Hastie, R. (1979). The independence of evaluative and item information: impression and recall order effects in behaviour based impression formation. *Journal of Personality and Social Psychology*, 37, 1758-1768.
- Dolcos, F. , & Cabeza, R. (2002). Event-related potentials of emotional memory: Encoding pleasant, unpleasant, and neutral pictures. *Cognitive, Affective & Behavioral Neuroscience*, 2, 252-263.
- Ehrlichman, H. , & Halpern, J. N. (1988). Affect and memory: Effects of pleasant and unpleasant odors on retrieval of happy or unhappy memories. *Journal of Personality and Social Psychology*, 55, 769-779.
- Esses, V. M. , Haddock, G. , & Zanna, M. P. (1993). Values, stereotypes, and emotions as determinants of intergroup attitudes. In D. M. Mackie & D. L. Hamilton (Eds), *Affect, Cognition, and Stereotyping: Interactive Processes in Group Perception* (pp. 137-66). New York Academic Press.
- Esses, V. M. , & Zanna, M. P. (1995). Mood and the expression of ethnic stereotypes. *Journal of Personality and Social Psychology*, 69, 1052-1068.
- Finkenauer, C. , & Rime", B. (1998). Socially shared emotional experiences vs. emotional experiences kept secret: Differential characteristics and consequences. *Journal of Social and Clinical Psychology*, 17, 295-318.

- Foa, E. B. , Feske, U. , Murdock, T. B., Kozak, M. J., & McCarthy, P. R. (1991). Processing of threat-related information in rape victims. *Journal of Abnormal Psychology, 100*, 156–162.
- Foa, E. B. , Ilai, D. , McCarthy, P. R., Shoyer, B., & Murdock, T. (1993). Information processing in obsessive–compulsive disorder. *Cognitive Therapy and Research, 17*, 173–189.
- Fox, E. (1993). Attentional bias in anxiety: Selective or not? *Behaviour Research and Therapy, 31*, 487–493.
- Freud, S. & Brill, A. A. (1914). *Psychopathology of Everyday Life*; New York: The Macmillan Company, 1914. Pp. vii, 342
- Gotlib, I. , & McCann, C. (1984). Construct accessibility and depression: An examination of cognitive and affective factors. *Journal of Personality and Social Psychology, 47*, 427-439.
- Helson, H. (1964). *Adaptation-level theory: An experimental and systematic approach to behavior*. New York: Harper and Row.
- Hendrick, C. , & Lilly, R. (1970). The structure of mood: A comparison between sleep deprivation and normal wakefulness conditions. *Journal of Personality, 38*, 453-465.
- Holmes, D. (1970). Differential change in affective intensity and the forgetting of unpleasant personal experiences. *Journal of Personality and Social Psychology, 15*, 234-239.
- Irwin, M. , Tripodi, T. and Bieri, J. (1967). ‘Affective stimulus value and cognitive complexity’, *Journal of Personality and Social Psychology, 5*: 444-448.
- Ito, T.A. & Cacioppo, J.T. (2005). Variations on a human universal: Individual

- Differences in positivity offset and negativity bias. *Cognition and Emotion*, 1, 1-26.
- Ito, T. A. , Cacioppo, J. T., & Lang, P. J. (1998). Eliciting affect using the International Affective Picture System: Trajectories through evaluative space. *Personality and Social Psychology Bulletin*, 24, 855-879.
- Izard, C. (1992). Basic emotions, relations among emotions, and emotion-cognition relations. *Psychological Review*, 99, 561-565.
- Joormann, J. , Teachman, B., & Gotlib, I. (2009). Sadder and less accurate? False memory for negative material in depression. *Journal of Abnormal Psychology*, 118, 412-417.
- Jung, C. G. (1910). The association method. *American Journal of Psychology*, 31, 219-269.
- Kanouse, D. E. , & Hansen, L. R., Jr. (1971). *Attribution: Perceiving the causes of behavior*. Morristown, NJ: General Learning Press.
- Kensinger, E.A. & Corkin, S. (2003). Effect of Negative Emotional Content on Working Memory and Long Term Memory. *Emotion*, 3, 378-393.
- Kosslyn, S.M. , Cacioppo, J.T., Davidson, R.J., Hugdahl, K., Lovallo, W.R. & Spiegel, D., et al (2002). Bridging psychology and biology: The analysis of individuals in groups. *American Psychologist*, 57, 341-351.
- Kousta, S.T. , Vinson, D.P., Vigliocco, G. (2009). Emotion words, regardless of polarity, have a processing advantage over neutral words. *Cognition*, 112, 473-481.
- Kreitler, H. & Kreitler, S. (1968). Unhappy memories of the happy past: Studies in Cognitive Dissonance. *British Journal of Psychology*, 39, 1222-1237.
- Larsen, J. T. (in press). Negativity bias. In D. Sander & K. Scherer (Eds.), *Oxford*

*companion to the affective sciences*. New York: Oxford University Press.

- Lewicka, M., Czapinski, J., Peeters, G. (1992). Positive-Negative Asymmetry or "When the heart needs a reason". *European Journal of Social Psychology*, 22, 425-434.
- Linton, M. (1982). Transformations of memory in everyday life. In U. Neisser (Ed.), *Memory observed: Remembering in natural contexts*. San Francisco: Freeman.
- Linton, M. (1986). Ways of searching and the contents of memory. In D. C. Rubin (Ed.), *Autobiographical memory*. Cambridge, England: Cambridge University Press.
- Lorr, M., Daston, P., & Smith, I. (1967). An Analysis of Mood States. *Educational and Psychological Measurement*, 27, 89-96.
- Martin, M., Horder, P., & Jones, G. V. (1992). Integral bias in naming of phobia-related words. *Cognition and Emotion*, 6, 479-486.
- Mathews, A., M., & Klug, F. (1993). Emotionality and interference with color-naming in anxiety. *Behaviour Research and Therapy*, 31, 57-62.
- Mathews, A. M., & Macleod, C. (1985). Selective processing of threat cues in anxiety states. *Behaviour Research and Therapy*, 31, 57-62.
- Matlin, M., & Gawron, V. (1979). Individual differences in Pollyannaism. *Journal of Personality Assessment*, 43, 411-412.
- Matlin, Margaret W., Stang, David J. (1978). *The Pollyanna Principle: Selectivity in Language, Memory, and Thought*; Cambridge, Mass.: Schenkman.
- Matt, J., Vasquez, C., & Campbell, W. K. (1992). Mood-congruent recall of affectively toned stimuli: A meta-analytic review. *Clinical Psychology Review*, 12, 227-255.
- Matsumoto, D., Ekman, P., Biehl, M., & Hearn, V. (1997). Matsumoto and Ekman's Japanese and Caucasian Facial Expressions of Emotion (JACFEE): Reliability data and cross-national differences. *Journal of Nonverbal Behavior*, 21, 3-21.



- Mayer, A. & Orth, J. Zur qualitativen Untersuchung der Assoziation. *Zeitschrift fuer Psychologie*, 26, 1-13.
- McNair, D. , & Lorr, M. (1964). An analysis of mood in neurotics. *The Journal of Abnormal and Social Psychology*, 69, 620-627.
- McNally, R. J., Riemann, B. C., Louro, C. E., Lukach, B. M., & Kim, E. (1992). Cognitive processing of emotional information in panic disorder. *Behaviour Research and Therapy*, 30, 143–149.
- Mehrabian, A. , & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: MIT Press.
- Menzerath, P. ,1908. *Die Bedeutung der sprachlichen Gelaueufigkeit oder der formalin sprachlichen Beziehung fuer die Reproduktion*.
- Newcomb, A.F. , Bukowski, W.M., & Pattee, L. (1993). Children's peer relations: A metaanalytic review of popular, rejected, controversial and average sociometric status. *Psychological Bulletin*, 113, 99–128.
- Nowlis, V. & Nowlis, H. H. (1956). The description and analysis of mood. *Techniques for the Study od Behavioral Effects of Drugs*, 65, 345-355.
- Nowlis, V. (1965). Research with the Mood Adjective Check List. *Affect, cognition, and personality: Empirical studies* Oxford England: Springer.
- Osgood, C. , Suci, G., & Tannenbaum, P. (1957). *The measurement of meaning*. Urbana, IL: University of Illinois.
- Peeters, G. , & Czapinski, J. (1990). Positive-negative asymmetry in evaluations: The distinction between affective and informational negativity effects. *European Review of Social Psychology*, 1, 33-60.
- Pratto, F., & John, O. P. (1991). Automatic vigilance: The attention grabbing power of

- negative social information. *Journal of Personality and Social Psychology*, 61, 380–391.
- Rapaport, D. (1961). *Emotions and Memory*; Science Editions, New York.
- Robinson-Riegler, G.L., & Winton, W.M. (1996). The role of conscious recollection in recognition of affective material: Evidence for positive-negative asymmetry. *Journal of General Psychology*, 123, 93–104.
- Rozin, P. , & Royzman, E. B. (2001). Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review*, 5, 296–320.
- Ryman, D. , Biersner, R., & La Rocco, J. (1974). Reliabilities and validities of the mood questionnaire. *Psychological Reports*, 35, 479–484.
- Schlossberg, H. (1952). The description of facial expressions in terms of two dimensions. *Journal of Experimental Psychology*, 44, 229–237.
- Siegel, J. , Johnson, J., & Sarason, I. (1979). Life changes and menstrual discomfort. *Journal of Human Stress*, 5(1), 41–46.
- Skowronski, J. J. , & Carlston, D. E. (1989). Negativity and extremity biases in impression formation: A review of explanations. *Psychological Bulletin*, 105, 131–142.
- Smith, N.K. , Cacioppo, J.T., Larsen, J.T., & Chartrand, T.L. (2003). May I have your attention, please: Electrocortical Responses to positive and negative stimuli. *Neuropsychologia*, 41, 171–183.
- Spaniol, J. , Voss, A., & Grady, C. (2008). Aging and emotional memory: Cognitive mechanisms underlying the positivity effect. *Psychology and Aging*, 23, 859–872.
- Storbeck, J. (2008). With sadness comes accuracy, with happiness, false memory: Affect influences processing styles. *Dissertation Abstracts International*, 69, 740.

- Stroop, J.R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, 18, 643-662.
- Taylor, S. E. (1991). Asymmetrical effects of positive and negative events: The mobilization – minimization hypothesis. *Psychological Bulletin*, 110, 67–85.
- Tellegen, A. (1985). Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In A. H. Tuma & J. D. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 681-706). Hillsdale, NJ: Lawrence Erlbaum.
- Thomas, D.L. , & Diener, E. (1990). Memory accuracy in the recall of emotions. *Journal of Personality and Social Psychology*, 59, 291-297.
- Thompson, C. P. (1985). Memory for unique personal events: Effects of pleasantness. *Motivation and Emotion*, 9, 277–289.
- Tolman, E. C. , & Johnson, I.(1918). A note on association time and feeling, *American Journal of Psychology*, 29, 187-195.
- Wagenaar, W. A. (1986). My memory: A study of autobiographical memory over six years. *Cognitive Psychology*, 18, 225–252.
- Watson, D. , & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin*, 98, 219-235.
- Watts, F. N. , McKenna, F. P., Sharrock, R., & Trezise, L. (1986). Colour naming of phobia-related words. *British Journal of Psychology*, 77, 97–108.
- White, M.M. & Powell M. (1936). The Differential Reaction Time for Pleasant and Unpleasant words. *The American Journal of Psychology*, 48, 126-133.
- White, R. T. (1982). *Memory for personal events*. Human Learning, I, 171–183.
- Williams, J.M.G., Mathews, A.,& Macleod, C.(1996). The emotional Stroop task and psychopathology. *Psychological Bulletin*, 120, 3-24.

Wundt, W. (1896). *Gundriss der Psychologie* . Leipzig, Germany: Entgelmann.

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An Exploratory Study on Reaction Time to Valenced Memories:

The Importance of Individual Differences

Emrah Ates

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## An Exploratory Study on Reaction Time to Valenced Memories:

### The Importance of Individual Differences

#### Abstract

The present study extends Jung's association method study on emotion. He measured his clients' reaction times for negative and positive words associated with previous memories, and reported that negative words took longer time to respond to. Baumeister's negativity bias theory was based on interference effects on cognitive processes, which included longer reaction time to negative events from long term memory. In contrast, Rozin and Royzman argued that long term memory is positively valenced based on their review on memory studies. The present study investigated the effect of valence on long term memory by measuring individual and group reaction times to positive and negative words. The group results indicate that there was a significant although small negativity bias in long term memory, consistent with Jung and Baumeister. However the idiographic results show that there was no effect of valence for 20 of the participants, there was a negativity bias effect for 14 participants and positivity bias for one participant. The results of the present study emphasized the importance of individual differences on reaction time to valenced long term memory.

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## An Exploratory Study on Reaction Time to Valenced Memories:

### The Importance of Individual Differences

In 1910, Jung conducted a systematic study in word association that was a milestone investigation in emotion. In his study, individuals were required to reply with whatever word comes into their minds as a reaction to the presented word as soon as possible. Jung compared the word associations of healthy controls with those of patients of varied diagnostic groups, and his interest centered on differences between the grammatical and logical relations of stimulus and reaction words given by the client. He measured his clients' reaction times for negative and positive words associated with previous memories, and reported that negative words took a longer time to respond to. Consequently, Jung interpreted these effects by claiming that prolonged reaction time is indicative of negative emotional experience. Jung's findings concerning individuals' reaction time to emotional words (reproduction-difficulties and complex-indicators) aroused great interest. The idea that the negative stimulus is psychologically treated differently in memory and in other fields of psychology was supported by consequent studies in emotion.

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Baumeister, Bratslavsky, Finkenauer and Vohs (2001) asserted that bad stimuli are stronger than good stimuli, in that negative affect is stronger and dominates positive affect. A large literature supports the existence of negativity bias in psychology (Baumeister et al., 2001; Cacioppo & Berntson, 1994; Cacioppo, Gardner, & Berntson, 1997; Ito, Cacioppo, & Lang, 1998; Kanouse & Hanson, 1971; Peeters & Czapinski, 1990; Skowronski & Carlston, 1998; Taylor, 1991). Baumeister and colleagues asserted that there is a negativity bias in long term memory (Bless et al, 1992; Dreben, Fiske &

Hastie, 1979; Kreitler & Kreitler, 1968; Robinson-Riegler & Winton; Skowronski & Carlston, 1987; 1996). For instance Robinson-Riegler and Winton (1996) showed that individuals remembered negatively valenced memories with significantly more details than positively valenced ones. Likely, Kensinger and Corkin (2003) used a free recall task that was given with a one day interval in which participants were asked to remember their answers. The results of the study revealed that individuals' recall are better for negatively valenced memories than positive and neutral ones. Hence, both studies show that there is an emotional negativity bias associated with long term memory.

There are few studies that showed no valence effect for long term memory. Siegel, Johnson and Sarason (1979) employed 244 female college students to study the effect of life changing events in long term memory. Positive and negative recent events marked on given checklists were used to study the recall rates of negative and positively valenced long term memories. The results revealed that there is no difference of retrieval rate on past negative and positive events of participants.

In contrast, there are studies that show positivity bias for long term memory (Baddeley, 1982; Ehrlichman & Halpern, 1988; Holmes, 1970; Linton, 1982; Linton, 1986; Matlin & Stang, 1978; Taylor, 1991; Thomas & Diener, 1990; Thompson, 1985; Wagenaar, 1986; White, 1982). Thomas and Diener (1990) found that individuals tend to underestimate the frequency of negative affect, but not positive affect. In the recall rate study of him, the results of the study revealed that the variance explained by the positive intensity was 30% whereas the variance explained by the negative intensity was 12%. Hence this study supports the positivity bias for recall accuracy. Likely, Rozin and Royzman (2001) reviewed evidence that there is a positivity bias effect on long term memory. Their hypothesis was based on the evidence from Matlin and Stang's meta-

analysis (1978) that showed the dominance of positivity bias in long term memory by reviewing 52 studies carried out until 1978. Taylor (1991) also came to a similar conclusion and revealed that positively valenced memories elicit more cognitive activity and carries more details about the event and hence has a better recall rate.

On the other hand, emotional Stroop task experiments have found that it takes a longer reaction time to name the colour of negatively valenced words, especially by pathological individuals (Gotlib & McCann, 1983; Williams, Mathews & MacLeod, 1996), but also for healthy participants (Pratto & John, 1991). Gotlib and McCann (1983) used neutral, negatively and positively valenced words in their study of students with mild depression. Fifteen high and 15 low scorers on the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) named the colours of 50 neutral, 50 negatively valenced and 50 positively valenced words presented. Results showed that the participants with mild depression were significantly slower (23 ms) in naming the colours of the negatively valenced words than of the positively valenced or neutral words. A long term memory task was presented during the second experiment of the same study, on recall rates of participants. Recall rates of individuals showed that all subjects (both depressed and non-depressed) recalled significantly more negatively valenced than either neutral or positively valenced words, with effect size of 0.76 (for negative vs. neutral words) and 0.48 (for negative vs. positive words). Williams et al., (1996) used threatening words in their experiment, and employed 24 anxious participants who were grouped on the basis of whether their worries were predominantly social or physical. The patients were tested with Stroop cards, each containing physical threat, social threat and unthreatening stimuli. The results showed that there was a significant (44 ms) delay with the response of colour naming for the threat words than for the non threat words. Moreover, there was also a relationship between the type of

threat word that most disrupted the colour naming and the type of worries that predominated in the patient. Only physical worriers were disrupted on the physical threat words (52 ms) whereas social worriers showed a 44 ms facilitation on the same words. Thus, the results of this study presented evidence for the presence of disruption which was significantly associated with the psychopathology of the individuals. These two studies present research evidence that the effect of emotional Stroop task is bigger with pathological groups.

In their study, Pratto and John (1991) asked healthy participants to name the colour that a word was printed in. They measured the time it took to identify the colour for a series of negative and positive adjectives that had previously rated for agreeableness. The results revealed that it took 29 ms longer for subjects to name the colours of negative words than for positive words. Moreover, they repeated the experiment one week after and asked the participants to recall as many words as they could. They found that there was a significant main effect for valence,  $F(1, 24) = 9.1, p = .006$ . Again, the mean response latencies were longer for undesirable traits ( $M = 612$  ms) than for desirable ones ( $M = 601$ ), and this effect held for 19 (76%) of the 25 subjects. They concluded that undesirable traits attract more attention than desirable traits for long term memory.

There are a small number of studies investigating reaction time to assess the effect of valence on long term memory. The methodologies used are different; which makes it difficult to draw clear conclusions, though most of the previous studies have found the negativity bias (Dahl, 2001; Freud, 1914; Jung, 1910; Menzerath, 1908; White & Powell, 1936; Wreschner, 1907). Jung (1910) was the first to take a systematic investigative step to study reaction time by association experiments. By studying individual cases, Jung concluded that prolonged reaction time was indicative of negative

emotional experience. Freud (1914) also reported prolonged reaction time to negatively valenced memories in the *Psychopathology of Everyday Life*. He proposed that studying reaction time is a way of discovering the unconscious, and he argued that the reason for prolonged reaction time to unpleasant memories is repression.

Two other studies showed evidence of negativity bias for healthy individuals' reaction time to valenced words (Dahl, 2001; White & Powell, 1936). In White and Powell's study (1936), two emotional word lists based on the subjects' previous answers were used in valenced word lists. The reaction times of 16 individuals for negatively and positively valenced words were measured and the results showed that negatively valenced words were significantly more slowly responded to than positively valenced words. The reaction time to positive words was 514 ms ( $SD=104$ ) and negatively valenced words was 600 ms ( $SD=135$ ) and the effect size as measured by Cohen's  $d$  was 0.82. Dahl (2001) used valenced word lists from the ANEW (Bradley & Lang, 1999), without controlling for arousal levels of words, and studied the reaction time on an emotion detection task. Dahl showed significantly prolonged response latencies for negative words compared to positive ones ( $M$  for negative words=958 ms,  $M$  for neutral words=1011 ms and  $M$  for positive words=904 ms) with an effect size of 0.33 as measured by Cohen's  $d$ . The difference between the effect sizes of Dahl's (2001) and White and Powell's (1936) study is important to emphasize. In White and Powell's study, emotional word lists were created based on the subjects' previous answers (pre-evaluation) and the most frequently given answers in subject group were used as stimuli during the free association experiment which shows that the stimuli had particular individual meaning for participants. Hence, the nature of word lists used in studies or the task employed being either free association or emotion detection might play an important role in the reason of different effect sizes between these two studies.

There are also reaction time studies that show no effect of valence on long term memory. For example in Spaniol, Voss and Grady's (2008) study, the reaction time to 132 words (negative, positive, neutral) selected from ANEW (Bradley & Lang, 1999) were measured for 47 participants. The experiment was a rating task based on participants' long term memory. The results revealed that there was no difference in participants' reaction time to valenced stimuli. The result of this study was consistent with Birnbaum (1919) who reported that there was no effect of valence on a free association task. In his study, Birnbaum used fixed word lists which are not based on participants' previous experiences, and he argued that this methodology might be the reason for indifferent results of his free association study.

Overall, the literature of reaction time to valenced long term memory studies (Dahl, 2001; Freud, 1914; Gotlib & McCann, 1983; Jung, 1910; Mayer & Orth, 1901; Menzerath, 1908; Pratto & John, 1991; White & Powell, 1936; Williams et al., 1996; Wreschner, 1907) predominantly supports negativity bias theory although there are two studies (Birnbaum, 1919; Spaniol et al., 2008) that presented no significant effect of valence in their results.

In 1957, an important milestone was reached by Osgood, Suci and Tannenbaum's study on dimensions of emotion. This study suggested that the structure of emotion could be separated into the two dimensions of "valence" and "arousal" which is an idea supported by other studies (Bradley & Lang, 2005; 2007; Mehrebian & Russell, 1974). To support these ideas, Bradley and Lang (1999) developed to provide a set of normative emotional ratings on valence and arousal levels known as the Affective Norms for English Words (ANEW). The ANEW is a set of normative emotional ratings for 1060 words in the English Language, rated in terms of pleasure, arousal, dominance and frequency levels. Earlier studies (e.g. Dahl, 2001; Spaniol et al., 2008; White and

Powell, 1936) either were unable or did not control for the dimensions of arousal and word frequency, and so the present study is the first to employ valenced word lists with controlled arousal and frequency levels.

The present experiment examined the effect of valence on long term memory by measuring reaction time of individuals to negatively and positively valenced words. The two word lists (positive and negative) were selected from ANEW (Bradley & Lang, 1999) with equal arousal and frequency levels. Individuals' reaction times to these words were measured in response to a task requiring them to decide whether or not they have previously experienced any emotional experience associated with the presented word. It was expected that responses to this task would be similar to those of the clinical free association task employed by Jung (1910) that participants' reaction time to negatively valenced words will be longer than the reaction time to positively valenced words.

## Method

### *Design*

A within-subjects design was used, where the dependent variable was the participants' reaction time. There were two levels of the independent variable; the negatively valenced word list and the positively valenced word list. The presentation order of the words was randomly generated for each participant on each trial to control for order effects.

### *Participants*

Thirty five participants aged between 19 to 46 years old (27 females, 8 males) were recruited from the School of Psychology of Edith Cowan University (ECU). All participants' mother tongue was English.



## Materials

The stimuli were drawn from the ANEW (Bradley & Lang, 2001). For the task, there were 173 negative and 173 positive selected words. Both word lists were controlled for arousal ( $M = 5.55$  for positive list,  $M = 5.54$  for negative list) and word frequency levels ( $M = 26.29$  for positive list,  $M = 25.98$  for negative list) (see Appendix A for positive word list and Appendix B for negative word list with controlled arousal and word frequency levels). Each word was displayed from the computer screen (Alevo Computers, School of Psychology and Social Science, ECU). SuperLab version 4.0 (Cedrus Corporation, 2006) was used to undertake the experiment, together with a response box manufactured by Cedrus Corporation (2006).

## Procedure

Participants were tested individually in quiet rooms within the School of Psychology and Social Science. After reading the information letter (Appendix C) and signing the informed consent form (Appendix D), the participant read the instructions on the screen of the computer: *"You will be presented some words on the screen, please press the 'yes' button if you remember a past emotional experience represented by the word you see, and the 'no' button if you do not remember"*.

The researcher gave an example of a word to illustrate the task and participant was asked if there were any questions to be answered before they commenced the task. The experimental phase began by participant's pressing one of the keys on the response box. Each word was displayed on the screen till the participant pressed any of the two buttons. Once the participant had responded, a one second waiting time associated with white screen background was arranged before the next word was presented. The task took between 15 to 45 minutes to complete.

## Results

The data were organized in two phases. First, a group analysis was conducted for reaction time to each word group. Secondly, individual differences are reported.

### *Phase I: Analysis of Word Group Effects*

Being positively skewed, the data were natural log transformed before statistical tests were applied. Following transformation, Levene's and Kolmogorov-Smirnov tests revealed that the assumptions of normality and homogeneity were met for the data at alpha level  $<.05$ . Consequently, a paired  $t$ -test was employed on the reaction time scores of positively and negatively valenced words for the group and individuals.

Responses to negatively valenced words were significantly slower than for positively valenced words. The mean reaction time for negatively valenced words was 1566 ms ( $SD=1749.6ms$ ), and the mean for positive valence was 1443 ms, ( $SD=1490.8$  ms),  $t(6055) = 63.408$ ,  $p < .05$ . Figure 1 below shows the main effect in terms of two word groups. The effect size calculated by Cohen's  $d$  (Cohen, 1988; Howell, 2002) was 0.058.

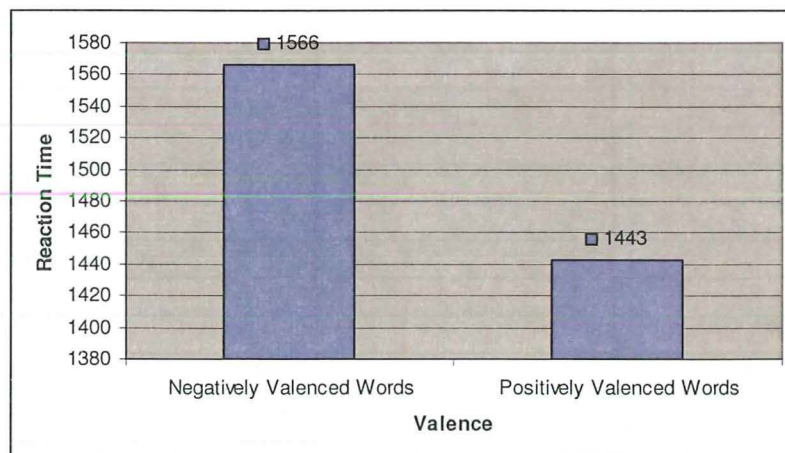


Figure 1: Overall reaction time difference to negatively and positively valenced words

*Phase II: Analysis of Individual Effects*

Although the results show that there is a significant difference between individuals` reaction times for positively and negatively valenced words, participants presented individual differences in the study. Individual effect sizes ranged from -0.185 to 0.544 as measured by Cohen`s *d*. Of the participants, 20 out of 35 individuals did not show any significant effect, 14 participants showed a significant negativity bias, and 1 participant showed a significant positivity bias for their reaction time to words. Table 2 below presents the effect sizes for each participant of the experiment.

Table 1  
*Individual Effect Sizes*

Subject No	Effect Size	Subject No	Effect Size
1	0.544	19	0.487
2	0.4469	20	0.2141
3	0.544	21	0.1328
4	0.1251	22	-0.0144
5	0.2117	23	-0.185
6	0.2307	24	-0.0238
7	0.1001	25	0.1452
8	0.2542	26	0.3293
9	0.3151	27	-0.0393
10	0.2943	28	0.0931
11	0.0788	29	-0.1308
12	0.0712	30	0.1911
13	0.1636	31	0.0964
14	0.1732	32	-0.0913
15	0.0823	33	0.0156
16	-0.074	34	0.0769
17	-0.0942	35	-0.0204
18	0.0815		

## Discussion

The significant results from the group analysis support the negativity bias theory (Baumeister et al., 2001) for long term memory. On the other hand, the idiographic analysis of results revealed that this was by no means a consistent pattern for all individuals. The results showed that 14 of 35 individuals gave a significantly longer reaction time to negatively valenced words; one participant gave a significantly longer reaction time to positively valenced words, while 20 participants showed no effect whatsoever.

### *Theoretical Implications from the Nomothetic Analysis*

Longer reaction times associated with negatively valenced words was observed as a result of the present experiment which is consistent with the results of Jung's association method and negativity bias theory (Baumeister et al., 2001). It has been asserted that the greater power of bad events over good ones is found in nearly every aspect of psychology including memory (Baumeister et al., 2001). Baumeister et al. (2001) reported that negative information dominates memory, and their review argued that the negatively valenced material received more thorough processing when it was encoded and was, therefore, retained in a more complex, elaborate memory trace which therefore leads to longer reaction times from long term memory. Freud (1914) also reported that individual emotional problems or complexes are retrieved with a longer reaction time from long term memory and argued that this is related to repression of these memories.

The effect size for the present experiment was small (0.058). One possible explanation for the low effect size might be related to the selection method of words in the task. The present study used Bradley and Lang's ANEW, which is based on the answers of students from University of Florida in 1999. Unlike the studies of Jung

(1910), and White and Powell (1936) which reported larger effect sizes, none of the negative words were established to have a personal meaning for the individual participants in the present study. A similar result to those of the present study was reported by Birnbaum (1919). In Birnbaum's study, arbitrarily selected words with negatively, positively and neutral valence were used as stimuli. He found no reaction time differences between the word groups using a free association task. A more recent study by Spaniol et al. (2008) also found no effect of valence on reaction time from long term memory where the valenced words were selected from Affective Norms for English Words (Bradley & Lang, 1999). These studies support the idea that past individual experiences rather than population norms for negative and positive valence play a key role in the reaction time to long term memories.

A second potential explanation for the small effect size may be the experimental task itself. The experimental task was derived from Jung's free association experimental task that asks for past emotional experience on presented words. The present study investigated whether a previous memory was evoked by the stimulus word. It is possible that the present experimental task was not as sensitive to individual memories, and it is therefore recommended that further experiments ask participants to respond with their own word, as is done in free association tasks. This would therefore represent a hybrid task, where the stimulus could be controlled using the ANEW database for valence and arousal, and a free associative response would be spoken by the participant. The onset of the speech response would provide the marker for the reaction time measure. The benefit of such a task is that it would be personalized to the participant's own memories.

A third possible reason for the low effect size of the present study might be associated with the decision to control arousal levels in the word lists used in the experiment. Jung (1910), White and Powell (1936) and Dahl (2001) used word lists

where arousal levels of words were not controlled. It is possible that valence is not a strong determinant of the negativity bias, but rather that negative valence was combined with strong arousal levels. Since the arousal levels of the word lists were controlled due to ANEW in the present study, this might have had an effect resulting in producing the low effect size. It is possible that a replication and extension of the present study where arousal was manipulated may show that arousal is the dominating variable for reaction time to emotional words on long term memory.

#### *Theoretical Implications from the Idiographic Analysis*

It is possible that nomothetical result of this exploratory study showed supportive evidence for the negativity bias theory. However, an individual based analysis should be integrated in order to enrich the understanding of results. The individual based results of the present study showed that there were 14 negatively biased participants, 20 non-significantly affected participants and one positively biased participant. It is possible that these results are stable individual differences, although this in itself would represent yet another research opportunity for the future. It would be important to establish whether a person who has negativity bias, neutral response or positivity bias remains consistent over time. Further research should assess the stability of the negativity bias, positivity bias, or no bias whatsoever in these participants, by using a test-retest experimental design.

Should the negativity, positivity or neutral individual differences be stable over time, this may explain why there are such inconsistencies in the literature on positivity and negativity bias in memory. In Jung's (1910) free association task study, particular attention was given to individual memories and experiences. He studied his patients individually and used critical words for each individual to run the word association experiment. Similarly, White and Powell's (1936) study also used word lists that were

produced on the personal answers of 16 participants, and the words generated in this way were used to form a subsequent word list, and the reaction times of participants were measured. Hence, in these two studies unlike other studies, the word selection was based on participants' past experiences and this resulted in a high group effect size of 0.82 measured by Cohen's  $d$ .

An important issue about the idiographic analysis is that the additional consideration of individual differences explains more about the experimental effect, compared to the nomothetic analysis itself. These results are consistent with the argument made by Kosslyn et al. (2002) that statistical inclusion of individual differences can lead to increased explained variance.

#### *Limitations of the Present Research*

There were at least four main limitations of the current design. Firstly, carry over effect, secondly the experiment sample, thirdly the subjective nature of participants, and lastly building a neutral word group into the experiment.

In his study of word association, Jung (1910) mentioned the important effect of carry over especially from critical words to the following words during free association task. Being a within subjects design, the present study presented the negatively valenced and positively valenced words in a randomised order, where the effect of one word may have easily been carried over to subsequent words. The carry over effect can occur especially after the individual is exposed to complex words (i.e., words related to highly negative past experiences). As Jung also indicated in his study, this can cause a change in the reaction time to subsequent words. To some extent, carry over effects were controlled in the current design through randomization. However, further research is suggested to specifically investigate the carry over effect and how this may interact with the individual differences.

Secondly, the subjective nature of the study can be an important limitation which shows that the results might be reflective of the personality dispositions of the participants. It is reasonable to argue that the degree of extraversion, neuroticism and even optimism and pessimism that an individual has will influence their responses in an emotional task. There is evidence in the cognitive literature that this is the case, with temperament and degree of state/trait anxiety influencing emotional task performance (Derryberry & Reed, 1994; Fox, Russo, & Dutton, 2002). Future experiments should consider using anxiety/depression scan tests prior to the experiment to potentially explain the individual differences observed.

The third limitation of this study is the subjective nature of the task. The present task (of asking whether a stimulus word evokes a memory or not) may not be as sensitive as asking a participant to vocalise an associated response word. Additionally, the response bias was evident from the individual based analysis of the present study which showed that some participants gave very long responses to some words. It would be interesting to follow up and find out whether these long responses were in fact due to a previous negative complex as suggested by Jung (1910).

#### *Recommendations for Future Research*

Given the number of different avenues of research suggested in this discussion, it is too early to suggest that the methodology may be used for diagnostic assessment. Jung (1910) argued that individual results may also serve as a potential diagnostic application for depression, anxiety disorder and neurosis. Moreover, the emotional Stroop task has been shown that depressed and anxious patients are particularly sensitive to negative emotional stimuli (Williams et al., 1996).

It is recommended that further exploratory research determine an optimum task to explore these individual differences, and assess their stability. Once this has occurred,



it may be possible to examine its clinical application. Once the optimum task has been established, it would be possible to mount a research programme that would investigate the relations between emotional task performance, personality and pathology (Greenwald, Cook, & Lang, 1989; Lang et al., 1993).

The present study had the aim to explore and provide direction for reaction time to valenced long term memories. The study established that there is a negativity bias, but that there are large individual differences. It is possible that experimental control of the arousal dimension reduced the group effect size observed. A follow up experiment manipulating arousal while controlling for intensity of valence would allow investigation of this possibility. There appears to be considerable physiological evidence that both arousal and valence are primary contributors for emotional task performance (Bradley & Lang, 2007a, 2007b), although the present study suggests that valence itself appears to have a significant, but small effect. As both valence and arousal are important for emotion, such an extension would help further understanding of the effect of emotional dimensions on long term memory.

### *Conclusion*

In summary, the group results of the present study provided significant evidence for a small negativity bias effect of valence on reaction time of long term memories while the dimension of arousal was controlled. Secondly, the results based on the idiographic analysis showed that valence has remarkable individual effects on reaction time. This result shows the importance of analysing for individual differences when conducting traditional nomothetic group analysis.

## References

- Baumeister, R. F. , Bratslavsky, E. , Finkenauer, C. , & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, 5, 323–370.
- Birnbaum, K.(1912). Ueber den Einfluss von Gefuehlsfaktoren auf die Assoziationen. *Monatschrift fuer Psyciatisches. Neuroogie*,. 32: 95-123.
- Bradley, M. M. , & Lang, P.J. (2007). Emotion and Motivation. In J.T. Cacioppo, L.G. Tassinary, & G.G. Berntson (Eds.), *Handbook of psychophysiology* (Third ed. , pp581-607). New York: Cambridge University Press.
- Cacioppo, J. T. , & Berntson, G. G. (1994). Relationship between attitudes and evaluative space: A critical review, with emphasis on the separability of positive and negative substrates. *Psychological Bulletin*, 115, 401–423.
- Cacioppo, J. T. , Gardner, W. L., & Berntson, G. G. (1997). Attitudes and evaluative space: Beyond bipolar conceptualizations and measures. *Personality and Social Psychology Review*, 1, 3–25.
- Cedrus Corporation (2006). SuperLab Stimulus Presentation Software (Version 4.0) [Computer Software]. San Pedro, CA: Cedrus Corporation.
- Cohen, J. (1998). *Statistical power analysis for the behavioral sciences*. New Jersey: Lawrance Erlbaum Associates, Inc.
- Dahl, M. (2001). Asymmetries in the processing of emotionally valenced words. *Scandinavian Journal of Psychology*, 2, 97-104.
- Davidson, R. J. , Irwin, W., (1999). The functional neuroanatomy of emotion and affective style. *Trends in Cognitive Science*, 3 , 11 –20.
- Demily, C. , Attala, N., Fouldrin, G., Czernecki, V., Ménard, J., Lamy, S., et al. (2009). The emotional stroop task: A comparison between schizophrenic subjects and controls. *European Psychiatry*, 108, 1105-1112

- Derryberry, D. & Reed, M. A. (1994). Temperament and attention: orienting toward and away from positive and negative signals. *Journal of Personality and Social Psychology*, 66, 1128-1139.
- Dolco, F., Labar, K., S., Cabeza, R. (2004). Dissociable effects of arousal and valence on prefrontal activity indexing emotional evaluation and subsequent memory: an event-related fMRI study. *Neuroimage*, 23, 64-74.
- Fox, E., Russo, R., & Dutton, K. (2002). Attentional bias for threat: Evidence for delayed disengagement from emotional faces. *Cognition and Emotion*, 16, 355-379.
- Greenwald, M. K., Cook, E.W., Lang, P. J. (1998). Affective judgement and psychophysiological response: Dimensional covariation in the evaluation of pictorial stimuli. *Journal of Psychophysiology*, 3, 51-64.
- Howell, D. C. (2002). Statistical methods for psychology (5<sup>th</sup> ed.) USA: Duxbury.
- Ito, T. A., Cacioppo, J. T., & Lang, P. J. (1998). Eliciting affect using the International Affective Picture System: Trajectories through evaluative space. *Personality and Social Psychology Bulletin*, 24, 855-879.
- Jung, C. G. (1910). The association method. *American Journal of Psychology*, 31, 219-269.
- 
- Kanouse, D. E., & Hansen, L. R., Jr. (1971). *Attribution: Perceiving the causes of behavior*. Morristown, NJ: General Learning Press.
- Kosslyn, S. M., Cacciopo, J.T., Davidson, R.J., Hugdahl, K., Lovallo, W.R., & Spiegel, D., et al. (2002) Bridging psychology and biology: The analysis of individuals in groups. *American Psychologist*, 57, 341-351.
- Lane, D. R., Nadel, L., 2000. *Cognitive Neuroscience of Emotion*. Oxford Univ. Press, Inc., New York.

- Lang, P.J., Bradley, M.M., & Cuthbert, B.n. (2005). *International Affective Picture System (IAPS): Affective ratings of pictures and instruction manual* (Tech.Rep.A-6). Gainesville, FL: University of Florida.
- Matlin, M.W. & Stang, D.J. (1978). *The Pollyanna Principle: Selectivity in Language, Memory, and Thought*. Cambridge, Mass.: Schenkman.
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA: MIT Press.
- Osgood, C., Suci, G., & Tannenbaum, P. (1957). *The measurement of meaning*. Urbana, IL: University of Illinois.
- Peeters, G., & Czapinski, J. (1990). Positive-negative asymmetry in evaluations: The distinction between affective and informational negativity effects. *European Review of Social Psychology*, 1, 33-60.
- Phan, K.L., Wager, T., Taylor, S.F., Liberzon, I., 2002. Functional neuroanatomy of emotion: a meta-analysis of emotion activation studies in PET and fMRI. *NeuroImage*, 16, 331– 348.
- Rapaport, D. (1961). *Emotions and Memory*; Science Editions, New York.
- Robinson-Riegler, G. L., & Winton, W.M. (1996). The role of conscious recollection in recognition of affective material: Evidence for positive-negative asymmetry. *Journal of General Psychology*, 123, 93-104.
- Rozin, P., & Royzman, E. B. (2001). Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review*, 5, 296–320.
- Skowronski, J.J., & Carlston, D.E. (1987). Social judgement and social memory: The role of cue diagnosticity in negativity, positivity and extremity biases. *Journal of personality and Social Psychology*, 52, 689-699.
- Taylor, S. E. (1991). Asymmetrical effects of positive and negative events: The

mobilization – minimization hypothesis. *Psychological Bulletin*, 110, 67–85.

White, M.M., & Powell, M. (1936). The Differential Reaction Time for Pleasant and

Unpleasant Words, *The American Journal of Psychology*, 48, 126-133.

Williams, J., Mathews, A., & MacLeod, C. (1996). The emotional Stroop task and

psychopathology. *Psychological Bulletin*, 120, 3-24.

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## Appendix A

## Positively Valenced Word List

Description	Valence		Arousal		Word Freq
	Mean	(SD)	Mean	(SD)	
heaven	7.3	2.39	5.61	3.2	43
bake	6.17	1.71	5.1	2.3	12
autumn	6.3	2.14	4.51	2.5	22
bar	6.42	2.05	5	2.83	82
agility	6.46	1.57	4.85	1.8	3
adult	6.49	1.5	4.76	1.95	25
abundance	6.59	2.01	5.51	2.63	13
athletics	6.61	2.08	6.1	2.29	9
astronaut	6.66	1.6	5.28	2.11	2
awed	6.7	1.38	5.74	2.31	5
casino	6.81	1.66	6.51	2.12	2
breeze	6.85	1.71	4.37	2.32	14
ace	6.88	1.93	5.5	2.66	15
chocolate	6.88	1.89	5.29	2.55	9
decorate	6.93	1.3	5.14	2.39	2
advantage	6.95	1.85	4.76	2.18	73
bliss	6.95	2.24	4.41	2.95	4
greet	7	1.52	5.27	2.31	7
incentive	7	1.72	5.69	2.45	12
jewel	7	1.72	5.38	2.54	1
pride	7	2.11	5.83	2.48	42
toy	7	2.01	5.11	2.84	4
bouquet	7.02	1.84	5.46	2.47	4
ambition	7.04	1.98	5.61	2.92	19
melody	7.07	1.79	4.98	2.52	21
snow	7.08	1.83	5.75	2.47	59
heal	7.09	4.77	2.23	5.79	2
masterful	7.09	1.78	5.2	2.85	2
heal	7.09	1.46	4.77	2.23	2
dignified	7.1	1.26	4.12	2.29	7
hopeful	7.1	1.46	5.78	2.09	12
song	7.1	1.97	6.07	2.42	70
travel	7.1	2	6.21	2.51	61
brother	7.11	2.17	4.71	2.68	73
ocean	7.12	1.72	4.95	2.79	34
soft	7.12	1.34	4.63	2.61	61
dancer	7.14	1.56	6	2.2	31
useful	7.14	1.6	4.26	2.47	58
brave	7.15	1.64	6.15	2.45	24
inspired	7.15	1.85	6.02	2.67	25
learn	7.15	1.49	5.39	2.22	84
dinner	7.16	1.5	5.43	2.14	91
champ	7.18	1.97	6	2.43	1

bless	7.19	1.69	4.05	2.59	9
palace	7.19	1.78	5.1	2.75	38
easygoing	7.2	1.5	4.3	2.52	1
lively	7.2	1.97	5.53	2.9	26
respectful	7.22	1.27	4.6	2.67	4
twilight	7.23	1.8	4.7	2.41	4
alive	7.25	2.22	5.5	2.74	57
perfection	7.25	2.05	5.95	2.73	11
sailboat	7.25	1.71	4.88	2.73	1
blossom	7.26	1.18	5.03	2.65	7
king	7.26	1.67	5.51	2.77	88
prestige	7.26	1.9	5.86	2.08	29
scholar	7.26	1.42	5.12	2.46	15
star	7.27	1.66	5.83	2.44	25
protected	7.29	1.79	4.09	2.77	31
dazzle	7.29	1.09	6.33	2.02	1
circus	7.3	1.84	5.97	2.59	7
heaven	7.3	2.39	5.61	3.2	43
soothe	7.3	1.85	4.4	3.08	2
festive	7.3	2.26	6.58	2.29	2
imagine	7.32	1.52	5.98	2.14	61
wit	7.32	1.9	5.42	2.44	20
bath	7.33	1.45	4.16	2.31	26
impressed	7.33	1.84	5.42	2.65	30
bride	7.34	1.71	5.55	2.74	33
fascinate	7.34	1.68	5.83	2.73	3
treat	7.36	1.38	5.62	2.25	26
intercourse	7.36	1.57	7	2.07	9
grateful	7.37	0.97	4.58	2.14	25
sky	7.37	1.4	4.27	2.17	58
grin	7.4	1.87	5.27	2.64	13
devoted	7.41	1.37	5.23	2.21	51
fantasy	7.41	1.9	5.14	2.82	14
jolly	7.41	1.92	5.57	2.8	4
silly	7.41	1.8	5.88	2.38	15
warmth	7.41	1.81	3.73	2.4	28
elegant	7.43	1.26	4.53	2.65	14
erotic	7.43	1.53	7.24	1.97	8
refreshment	7.44	1.29	4.45	2.7	2
elated	7.45	1.77	6.21	2.3	3
magical	7.46	1.64	5.95	2.36	12
dollar	7.47	1.72	6.07	2.67	46
eat	7.47	1.73	5.69	2.51	61
outdoors	7.47	1.8	5.92	2.55	6
memories	7.48	1.61	6.1	2.1	15
applause	7.5	1.5	5.8	2.79	14
bright	7.5	1.55	5.4	2.33	87
luscious	7.5	1.08	5.34	2.51	2
wise	7.52	1.23	3.91	2.64	36

flirt	7.52	1.19	6.91	1.69	1
angel	7.53	1.58	4.83	2.63	18
reward	7.53	1.67	4.95	2.62	15
gold	7.54	1.63	5.76	2.79	52
glory	7.55	1.68	6.02	2.71	21
holiday	7.55	2.14	6.59	2.73	17
loyal	7.55	1.9	5.16	2.42	18
fireworks	7.55	1.5	6.67	2.12	5
puppy	7.56	1.9	5.85	2.78	2
talent	7.56	1.25	6.27	1.8	40
dog	7.57	1.66	5.76	2.5	75
secure	7.57	1.76	3.14	2.47	30
spouse	7.58	1.48	5.21	2.75	3
beautiful	7.6	1.64	6.17	2.34	127
adventure	7.6	1.5	6.98	2.15	14
improve	7.65	1.16	5.69	2.15	39
thoughtful	7.65	1.03	5.72	2.3	11
honor	7.66	1.24	5.9	1.83	66
sunset	7.68	1.72	4.2	2.99	14
honest	7.7	1.43	5.32	1.92	47
riches	7.7	1.95	6.17	2.7	2
wealthy	7.7	1.34	5.8	2.73	12
progress	7.73	1.34	6.02	2.58	120
savior	7.73	1.56	5.8	3.01	6
admired	7.74	1.84	6.11	2.36	17
outstanding	7.75	1.75	6.24	2.59	37
pretty	7.75	1.26	6.03	2.22	107
sunlight	7.76	1.43	6.1	2.3	17
gift	7.77	2.24	6.14	2.76	33
trophy	7.78	1.22	5.39	2.44	8
enjoyment	7.8	1.2	5.2	2.72	21
triumph	7.8	1.83	5.78	2.6	22
adorable	7.81	1.24	5.12	2.71	3
beauty	7.82	1.16	4.95	2.57	71
kindness	7.82	1.39	4.3	2.62	5
wedding	7.82	1.56	5.97	2.85	32
birthday	7.84	1.92	6.68	2.11	18
caress	7.84	1.16	5.14	3	1
sunrise	7.86	1.35	5.06	3.05	10
luxury	7.88	1.49	4.75	2.91	21
waterfall	7.88	1.03	5.37	2.84	2
achievement	7.89	1.38	5.53	2.81	65
merry	7.9	1.49	5.9	2.42	8
diamond	7.92	1.2	5.53	2.96	8
snuggle	7.92	1.24	4.16	2.8	4
handsome	7.93	1.47	5.95	2.73	40
satisfied	7.94	1.19	4.94	2.63	36
aroused	7.97	1	6.63	2.7	20
acceptance	7.98	1.42	5.4	2.7	49



liberty	7.98	1.22	5.6	2.65	46
ecstasy	7.98	1.52	7.38	1.92	6
hug	8	1.55	5.35	2.76	3
beach	8.03	1.59	5.53	3.07	61
millionaire	8.03	1.42	6.14	2.7	2
proud	8.03	1.56	5.56	3.01	50
thrill	8.05	1.48	8.02	1.65	5
cheer	8.1	1.17	6.12	2.45	8
valentine	8.11	1.35	6.06	2.91	2
rainbow	8.14	1.23	4.64	2.88	4
terrific	8.16	1.12	6.23	2.73	5
vacation	8.16	1.36	5.64	2.99	47
graduate	8.19	1.13	7.25	2.25	30
baby	8.22	1.2	5.53	2.8	62
joyful	8.22	1.22	5.98	2.54	1
delight	8.26	1.04	5.44	2.88	29
treasure	8.27	0.9	6.75	2.3	4
pleasure	8.28	0.92	5.74	2.81	62
success	8.29	0.93	6.11	2.65	93
orgasm	8.32	1.31	8.1	1.45	7
romantic	8.32	1	7.59	2.07	32
comedy	8.37	0.94	5.85	2.81	39
fun	8.37	1.11	7.22	2.01	44
excellence	8.38	0.96	5.54	2.67	15
win	8.38	0.92	7.72	2.16	55
affection	8.39	0.86	6.21	2.75	18
sweetheart	8.42	0.83	5.5	2.73	9
friendly	8.43	1.08	5.11	2.96	61
champion	8.44	0.9	5.85	3.15	23
humor	8.56	0.81	5.5	2.91	47
loved	8.64	0.71	6.38	2.68	56
paradise	8.72	0.6	5.12	3.38	12
triumphant	8.82	0.73	6.78	2.58	5
TOTAL					
MEANS	7.50637931		5.553851		26.29885

## Appendix B

## Negatively Valenced Word List

Description	Valence		Arousal		Word Freq
	Mean	(SD)	Mean	(SD)	
funeral	1.39	0.87	4.94	3.21	33
rejected	1.5	1.09	6.37	2.56	33
murderer	1.53	0.96	7.47	2.18	19
unhappy	1.57	0.96	4.18	2.5	26
death	1.61	1.4	4.59	3.07	277
loneliness	1.61	1.02	4.56	2.97	9
sad	1.61	0.95	4.13	2.38	35
slaughter	1.64	1.18	6.77	2.42	10
infection	1.66	1.34	5.03	2.77	8
poverty	1.67	0.9	4.87	2.66	20
grief	1.69	1.04	4.78	2.84	10
failure	1.7	1.07	4.95	2.81	89
disaster	1.73	1.13	6.33	2.7	26
abuse	1.8	1.23	6.83	2.7	18
mutilate	1.82	1.45	6.41	2.94	3
depressed	1.83	1.42	4.72	2.95	11
slave	1.84	1.13	6.21	2.93	30
depression	1.85	1.67	4.54	3.19	24
hurt	1.9	1.26	5.85	2.49	37
sick	1.9	1.14	4.29	2.45	51
nightmare	1.91	1.54	7.59	2.23	9
drown	1.92	1.48	6.57	2.33	3
morgue	1.92	1.32	4.84	2.96	1
misery	1.93	1.6	5.17	2.69	15
terrible	1.93	1.44	6.27	2.44	45
dead	1.94	1.76	5.73	2.73	174
distressed	1.94	1.1	6.4	2.38	4
jail	1.95	1.27	5.49	2.67	21
cruel	1.97	1.67	5.68	2.65	15
hatred	1.98	1.92	6.66	2.56	20
paralysis	1.98	1.44	4.73	2.83	6
poison	1.98	1.44	6.05	2.82	10
afraid	2	1.28	6.67	2.54	57
bankrupt	2	1.31	6.21	2.79	5
upset	2	1.18	5.86	2.4	14
headache	2.02	1.06	5.07	2.74	5
despise	2.03	1.38	6.28	2.43	7
accident	2.05	1.19	6.26	2.87	33
prison	2.05	1.34	5.7	2.56	42
maggot	2.06	1.47	5.28	2.96	2
leprosy	2.09	1.4	6.29	2.23	1
stress	2.09	1.41	7.45	2.38	107
demon	2.11	1.56	6.76	2.68	9

anguished	2.12	1.56	5.33	2.69	2
hate	2.12	1.72	6.95	2.56	42
pain	2.13	1.81	6.5	2.49	88
thief	2.13	1.69	6.89	2.13	8
useless	2.13	1.42	4.87	2.58	17
lonely	2.17	1.76	4.51	2.68	25
troubled	2.17	1.21	5.94	2.36	31
corpse	2.18	1.48	4.74	2.94	7
victim	2.18	1.48	6.06	2.32	27
discomfort	2.19	1.23	4.17	2.44	7
stench	2.19	1.37	4.36	2.46	1
helpless	2.2	1.42	5.34	2.52	21
crushed	2.21	1.74	5.52	2.87	10
devil	2.21	1.99	6.07	2.61	25
debt	2.22	1.17	5.68	2.74	13
divorce	2.22	1.88	6.33	2.71	29
punishment	2.22	1.41	5.93	2.4	21
traitor	2.22	1.69	5.78	2.47	2
hell	2.24	1.62	5.38	2.62	95
fearful	2.25	1.18	6.33	2.28	13
loser	2.25	1.48	4.95	2.57	1
sickness	2.25	1.71	5.61	2.67	6
dreadful	2.26	1.91	5.84	2.62	10
rotten	2.26	1.37	4.53	2.38	2
fat	2.28	1.92	4.81	2.8	60
massacre	2.28	1.74	5.33	2.63	1
insult	2.29	1.33	6	2.46	7
crash	2.31	1.44	6.95	2.44	20
lice	2.31	1.78	5	2.26	2
stupid	2.31	1.37	4.72	2.71	24
stupid	2.31	1.37	4.72	2.71	24
defeated	2.34	1.66	5.09	3	15
insecure	2.36	1.33	5.56	2.34	3
tumor	2.36	2.04	6.51	2.85	17
execution	2.37	2.06	5.71	2.74	15
slum	2.39	1.25	4.78	2.52	8
starving	2.39	1.82	5.61	2.53	6
malaria	2.4	1.38	4.4	2.54	3
alone	2.41	1.77	4.83	2.66	195
selfish	2.42	1.62	5.5	2.62	8
agony	2.43	2.17	6.06	2.67	9
despairing	2.43	1.47	5.68	2.37	4
ugly	2.43	1.27	5.38	2.23	21
mad	2.44	1.72	6.76	2.26	39
disgusted	2.45	1.41	5.42	2.59	6
hardship	2.45	1.61	4.76	2.55	9
ache	2.46	1.52	5	2.45	4
filth	2.47	1.68	5.12	2.32	2
addict	2.48	2.08	5.66	2.26	1

frustrated	2.48	1.64	5.61	2.76	10
illness	2.48	1.4	4.71	2.24	20
injury	2.49	1.76	5.69	2.06	27
rude	2.5	2.11	6.31	2.47	6
shamed	2.5	1.34	4.88	2.27	1
addicted	2.51	1.42	4.81	2.46	3
jealousy	2.51	1.83	6.36	2.66	4
wounds	2.51	1.58	5.82	2.01	8
smallpox	2.52	2.08	5.58	2.13	2
coffin	2.56	1.96	5.03	2.79	7
guilty	2.63	1.98	6.04	2.76	29
destroy	2.64	2.03	6.83	2.38	48
fraud	2.67	1.66	5.75	2.45	8
trash	2.67	1.45	4.16	2.16	2
slime	2.68	1.66	5.36	2.63	1
venom	2.68	1.81	6.08	2.44	2
malice	2.69	1.84	5.86	2.75	2
hostile	2.73	1.5	6.44	2.28	19
annoy	2.74	1.81	6.49	2.17	2
crisis	2.74	2.23	5.44	3.07	82
abduction	2.76	2.06	5.53	2.43	1
fear	2.76	2.12	6.96	2.17	127
fever	2.76	1.64	4.29	2.31	19
horror	2.76	2.25	7.21	2.14	17
offend	2.76	1.5	5.56	2.06	4
scared	2.78	1.99	6.82	2.03	21
displeased	2.79	2.23	5.64	2.48	7
lie	2.79	1.92	5.96	2.63	59
mosquito	2.8	1.91	4.78	2.72	1
sin	2.8	1.67	5.78	2.21	53
foul	2.81	1.52	4.93	2.23	4
impotent	2.81	1.92	4.57	2.59	2
louse	2.81	1.92	4.98	2.03	3
lost	2.82	1.83	5.82	2.62	173
penalty	2.83	1.56	5.1	2.31	14
alcoholic	2.84	2.34	5.69	2.36	3
scorn	2.84	2.07	5.48	2.52	4
insane	2.85	1.94	5.83	2.45	13
germs	2.86	1.39	4.49	2.24	1
mistake	2.86	1.79	5.18	2.42	34
surgery	2.86	2.19	6.35	2.32	6
blister	2.88	1.75	4.1	2.34	3
menace	2.88	1.64	5.52	2.45	9
crime	2.89	2.06	5.41	2.69	34
bloody	2.9	1.98	6.41	2	8
deceit	2.9	1.63	5.68	2.46	2
criminal	2.93	1.66	4.79	2.51	24
quarrel	2.93	2.06	6.29	2.56	20
waste	2.93	1.76	4.14	2.3	35

tomb	2.94	1.88	4.73	2.72	11
danger	2.95	2.22	7.32	2.07	70
riot	2.96	1.93	6.39	2.63	7
wicked	2.96	2.37	6.09	2.44	9
garbage	2.98	1.96	5.04	2.5	7
discouraged	3	2.16	4.53	2.11	15
stink	3	1.79	4.26	2.1	3
blind	3.05	1.99	4.39	2.36	47
broken	3.05	1.92	5.43	2.42	63
damage	3.05	1.65	5.57	2.26	33
allergy	3.07	1.64	4.64	2.34	1
delayed	3.07	1.74	5.62	2.39	25
assassin	3.09	2.09	6.28	2.53	6
crude	3.12	1.65	5.07	2.37	15
confused	3.21	1.51	6.03	1.88	44
fire	3.22	2.06	7.17	2.06	187
beggar	3.22	2.02	4.91	2.45	2
evil	3.23	2.64	6.39	2.44	72
avalanche	3.29	1.95	5.54	2.37	1
bullet	3.29	2.06	5.33	2.48	28
bullet	3.29	2.06	5.33	2.48	28
bastard	3.36	2.16	6.07	2.15	12
fault	3.43	1.38	4.07	1.69	22
gun	3.47	2.48	7.02	1.84	118
abortion	3.5	2.3	5.39	2.8	6
cut	3.64	2.08	5	2.32	192
arrogant	3.69	2.4	5.65	2.23	2
cell	3.82	1.7	4.08	2.19	65
alimony	3.95	2	4.3	2.29	2
chaos	4.17	2.36	6.67	2.06	17
absurd	4.26	1.82	4.36	2.2	17
cellar	4.32	1.68	4.39	2.33	26
bereavement	4.57	1.7	4.2	2.15	4
TOTAL					
MEANS	2.513391		5.549425		25.98276

## Appendix C

**HUMAN RESEARCH ETHICS COMMITTEE**

For all queries, please contact:

Research Ethics Officer

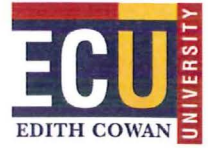
Edith Cowan University

100 Joondalup Drive

JOONDALUP WA 6027

Phone: 6304 2170

Fax: 6304 2661

Email: [research.ethics@ecu.edu.au](mailto:research.ethics@ecu.edu.au)

**Information Letter to Participants**  
**Do bad words take more time to respond to than good words?**

Dear Participant,

I am a fourth year honours student in the School of Psychology and Social Science at Edith Cowan University, conducting research on emotion under the supervision of Dr. Ken Robinson. This research project is being undertaken as part of the requirement of honours program at Edith Cowan University. Emotion is one of the main topics in psychology, and I expect that your participation will add value to the literature on emotion field of psychology.

Participation in this project is voluntary and anonymous. You do not need to explain or justify yourself if you choose not to participate. The study takes about fifteen minutes of your time, and I will ask you to answer the task question related to words presented on the screen of the computer. If you agree to participate, please sign the consent form. Any information provided by you will be considered confidential, although you should be aware that the results will be published in a scientific journal. Should this occur, you will not be identifiable.

There are no known or anticipated risks for participation in the study, however should you feel any emotional discomfort during the study please let me know immediately. Also you are free to withdraw your consent and leave the study at any time.

If you have any questions or require any further information about this study, please feel free to contact Emrah Ates at 0415908855 and Dr. Ken Robinson at 6304 5834. If you have any concerns or complaints about the research project and wish to talk to an independent person, you may contact: Research Ethics Officer, Edith Cowan University, 100 Joondalup Drive JOONDALUP WA 6027 Phone (08) 6304 2170, Email: [research.ethics@ecu.edu.au](mailto:research.ethics@ecu.edu.au) . Thank you in advance for your interest in this project.

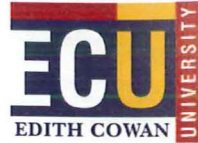
Emrah Ates & Dr. Ken Robinson,

School of Psychology and Social Science, ECU.

## Appendix D

**HUMAN RESEARCH ETHICS COMMITTEE**

For all queries, please contact:  
 Research Ethics Officer  
 Edith Cowan University  
 100 Joondalup Drive  
 JOONDALUP WA 6027  
 Phone: 6304 2170  
 Fax: 6304 2661  
 Email: research.ethics@ecu.edu.au

**Informed Consent Document****Do bad words take more time to respond to than good words?**

I have read the information presented in the information letter about a study being conducted by Emrah Ates and Dr. Ken Robinson of the School of Psychology and Social Science at Edith Cowan University. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted. I am aware that I can contact the research team if I want to ask more questions after the research session. I am aware that I may withdraw from the study without penalty at any time by advising the researchers of this decision.

I.....

- understand that the information provided will be kept confidential, and that the identity of participants will not be disclosed without consent.
- understand that the information provided will only be used for the purposes of this research project, and understand how the information is to be used.
- freely agree to participate in the project.

I agree to participate in this study.

Signature of Participant \_\_\_\_\_

Signature of Researcher \_\_\_\_\_

Emrah Ates (Chief Investigator)

If you have any questions or require any further information about this study, please feel free to contact Emrah Ates at 0415908855 and Dr. Ken Robinson at 6304 5834. Thank you in advance for your interest in this project.

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### **Emotion**

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Manuscripts devoted to surveys of the literature are acceptable only if they can be considered as a major contribution to the field, documenting cumulative evidence and highlighting central theoretical and/or methodological issues of scientific debate.

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Manuscripts submitted as Theoretical Notes should not exceed 5,000 words (exclusive of references). There should be no more than 50 references.

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